



## 2N3416 2N3417



### NPN General Purpose Amplifier

This device is designed for use as general purpose amplifiers and switches requiring collector currents to 300 mA. Sourced from Process 10. See PN100A for characteristics.

#### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	50	V
V <sub>CBO</sub>	Collector-Base Voltage	50	V
V <sub>EBO</sub>	Emitter-Base Voltage	5.0	V
I <sub>C</sub>	Collector Current - Continuous	500	mA
T <sub>J</sub> , T <sub>stg</sub>	Operating and Storage Junction Temperature Range	-55 to +150	°C

\* These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

#### NOTES:

- 1) These ratings are based on a maximum junction temperature of 150 degrees C.
- 2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

#### Thermal Characteristics

TA = 25°C unless otherwise noted

Symbol	Characteristic	Max	Units
		2N3416 / 2N3417	
P <sub>D</sub>	Total Device Dissipation Derate above 25°C	625 5.0	mW mW/°C
R <sub>θJC</sub>	Thermal Resistance, Junction to Case	83.3	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	200	°C/W

## NPN General Purpose Amplifier

(continued)

## Electrical Characteristics

TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
OFF CHARACTERISTICS					
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage*	$I_C = 10 \text{ mA}$ , $I_B = 0$	50		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 10 \mu\text{A}$ , $I_E = 0$	50		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 10 \mu\text{A}$ , $I_C = 0$	5.0		V
$I_{CBO}$	Collector-Cutoff Current	$V_{CB} = 25 \text{ V}$ , $I_E = 0$ $V_{CB} = 18 \text{ V}$ , $I_E = 0$ , $T_A = 100^\circ\text{C}$		100 15	nA $\mu\text{A}$
$I_{EBO}$	Emitter-Cutoff Current	$V_{EB} = 5.0 \text{ V}$ , $I_C = 0$		100	nA

## ON CHARACTERISTICS\*

$h_{FE}$	DC Current Gain	$V_{CE} = 4.5 \text{ V}$ , $I_C = 2.0 \text{ mA}$ <b>2N3416</b> <b>2N3417</b>	75 180	225 540	
$V_{CE(\text{sat})}$	Collector-Emitter Saturation Voltage	$I_C = 50 \text{ mA}$ , $I_B = 3.0 \text{ mA}$		0.3	V
$V_{BE(\text{sat})}$	Base-Emitter Saturation Voltage	$I_C = 50 \text{ mA}$ , $I_B = 3.0 \text{ mA}$	0.6	1.3	V

## SMALL SIGNAL CHARACTERISTICS

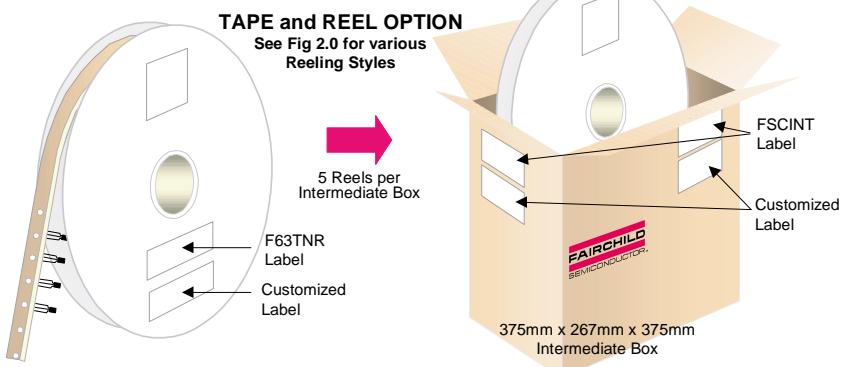
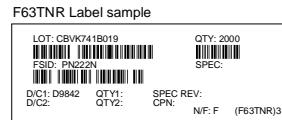
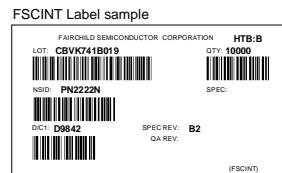
$h_{fe}$	Small-Signal Current Gain	$I_C = 2.0 \text{ mA}$ , $V_{CE} = 4.5 \text{ V}$ , $f = 1.0 \text{ kHz}$ <b>2N3416</b> <b>2N3417</b>	75 180		
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\*Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$

## TO-92 Tape and Reel Data



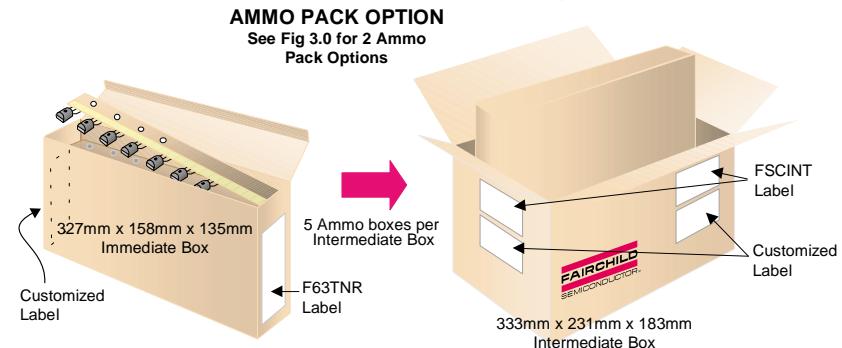
### TO-92 Packaging Configuration: Figure 1.0



#### TO-92 TNR/AMMO PACKING INFORMATION

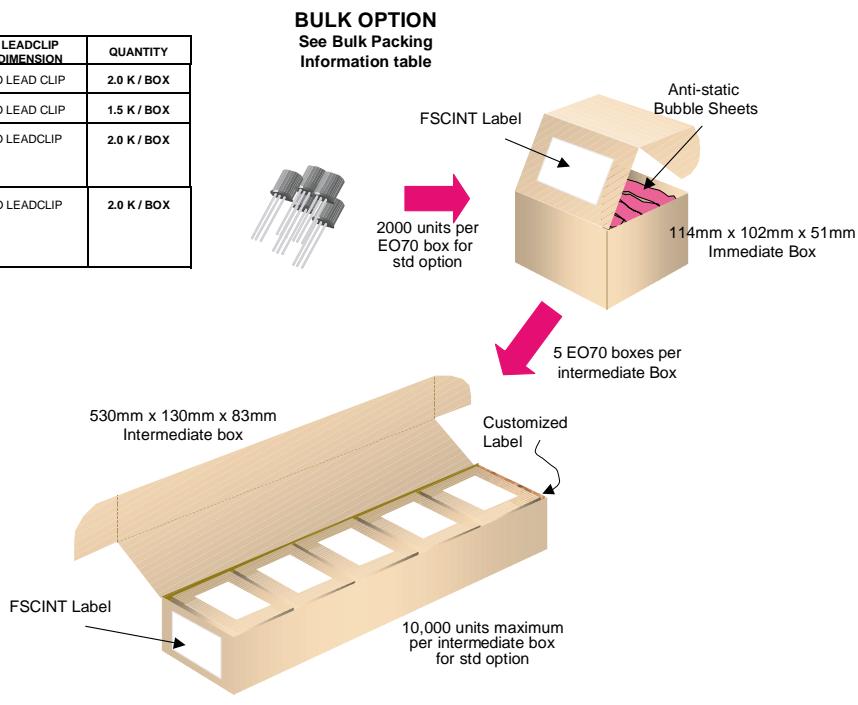
Packing	Style	Quantity	EOL code
Reel	A	2,000	D26Z
	E	2,000	D27Z
Ammo	M	2,000	D74Z
	P	2,000	D75Z

Unit weight = 0.22 gm  
Reel weight with components = 1.04 kg  
Ammo weight with components = 1.02 kg  
Max quantity per intermediate box = 10,000 units



#### (TO-92) BULK PACKING INFORMATION

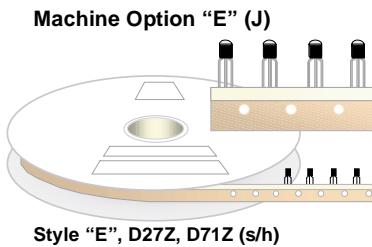
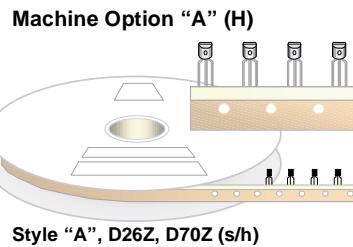
EOL CODE	DESCRIPTION	LEADCLIP DIMENSION	QUANTITY
J18Z	TO-18 OPTION STD	NO LEAD CLIP	2.0 K / BOX
J05Z	TO-5 OPTION STD	NO LEAD CLIP	1.5 K / BOX
NO EOL CODE	TO-92 STANDARD STRAIGHT FOR: PKG 92, 94 (NON PROELECTRON SERIES), 96	NO LEADCLIP	2.0 K / BOX
L34Z	TO-92 STANDARD STRAIGHT FOR: PKG 94 (PROELECTRON SERIES BCXXX, BFXXX, BSXXX), 97, 98	NO LEADCLIP	2.0 K / BOX



## TO-92 Tape and Reel Data, continued

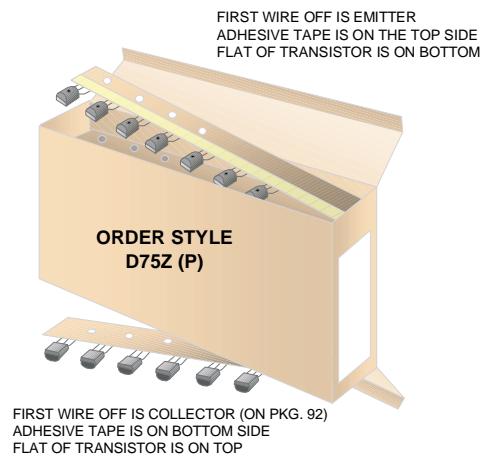
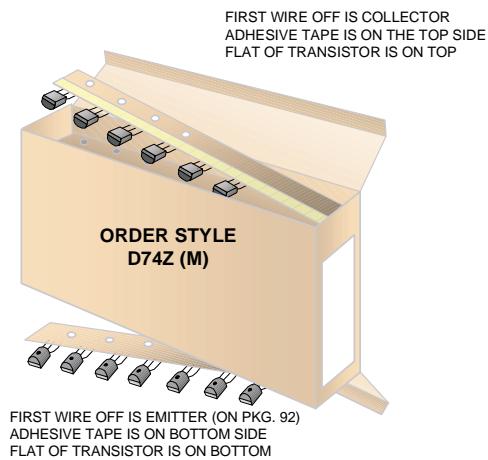
### TO-92 Reeling Style

Configuration: Figure 2.0



### TO-92 Radial Ammo Packaging

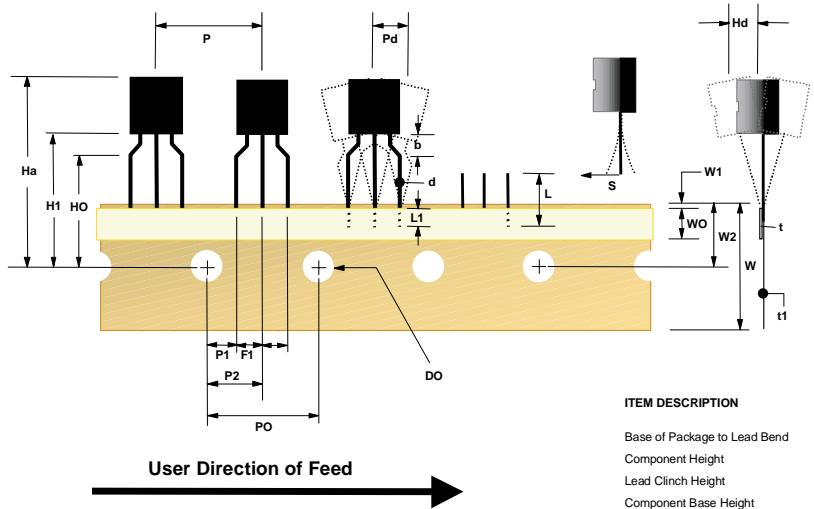
Configuration: Figure 3.0



## TO-92 Tape and Reel Data, continued

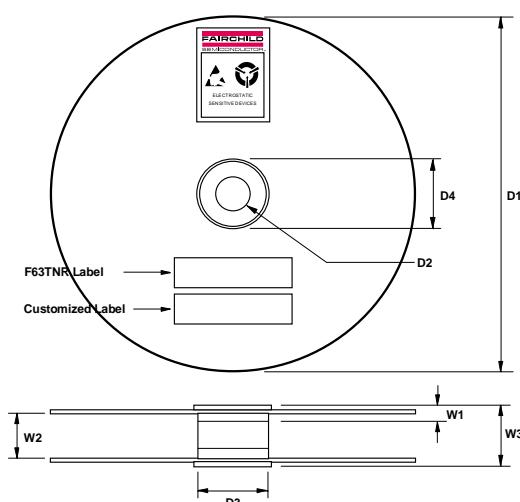
### TO-92 Tape and Reel Taping

Dimension Configuration: Figure 4.0



### TO-92 Reel

Configuration: Figure 5.0



ITEM DESCRIPTION	SYMBOL	DIMENSION
Base of Package to Lead Bend	b	0.098 (max)
Component Height	Ha	0.928 (+/- 0.025)
Lead Clinch Height	HO	0.630 (+/- 0.020)
Component Base Height	H1	0.748 (+/- 0.020)
Component Alignment ( side/side )	Pd	0.040 (max)
Component Alignment ( front/back )	Hd	0.031 (max)
Component Pitch	P	0.500 (+/- 0.020)
Feed Hole Pitch	PO	0.500 (+/- 0.008)
Hole Center to First Lead	P1	0.150 (+/- 0.009, -0.010)
Hole Center to Component Center	P2	0.247 (+/- 0.007)
Lead Spread	F1/F2	0.104 (+/- 0.010)
Lead Thickness	d	0.018 (+0.002, -0.003)
Cut Lead Length	L	0.429 (max)
Taped Lead Length	L1	0.209 (+0.051, -0.052)
Taped Lead Thickness	t	0.032 (+/- 0.006)
Carrier Tape Thickness	t1	0.021 (+/- 0.006)
Carrier Tape Width	W	0.708 (+0.020, -0.019)
Hold - down Tape Width	WO	0.236 (+/- 0.012)
Hold - down Tape position	W1	0.035 (max)
Feed Hole Position	W2	0.360 (+/- 0.025)
Sprocket Hole Diameter	DO	0.157 (+0.008, -0.007)
Lead Spring Out	S	0.004 (max)

Note : All dimensions are in inches.

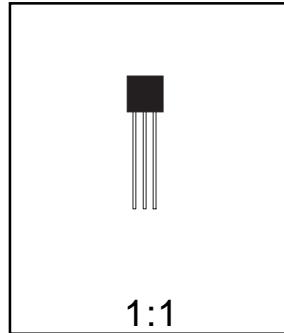
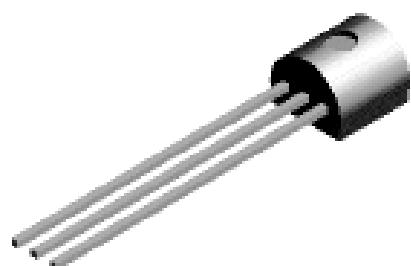
ITEM DESCRIPTION	SYMBOL	MINIMUM	MAXIMUM
Reel Diameter	D1	13.975	14.025
Arbor Hole Diameter (Standard)	D2	1.160	1.200
(Small Hole)	D2	0.650	0.700
Core Diameter	D3	3.100	3.300
Hub Recess Inner Diameter	D4	2.700	3.100
Hub Recess Depth	W1	0.370	0.570
Flange to Flange Inner Width	W2	1.630	1.690
Hub to Hub Center Width	W3		2.090

Note: All dimensions are inches

## TO-92 Package Dimensions

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## TO-92 (FS PKG Code 92, 94, 96)



1:1

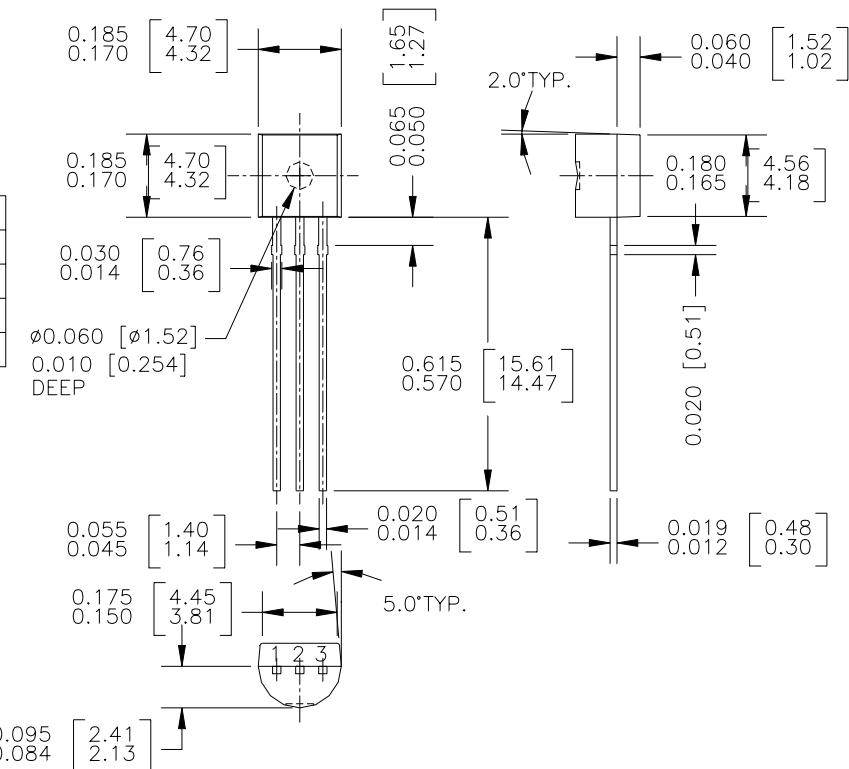
Scale 1:1 on letter size paper

Dimensions shown below are  
inches [millimeters]

Part Weight per unit (gram): 0.1977

TO-92 (92,94,96)

PIN	92		94		96	
	B	F	B	F	B	F
1	E	D	E	D	B	S
2	B	S	C	G	E	D
3	C	G	B	S	C	G



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